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REVISION OF THE NORTH AMERICAN SPECIES OF LESKEA.

By DR. G. N. BEST.

Key to the Species.

EULESKEA: leaves papillose, costate; median cells usually isodiametric; peristomial teeth abruptly incurved from a bulging base when dry.

Leaves ovate-lanceolate, acute to acuminate, more than twice as long as wide.

Leaves more or less secund; leaf-cells distinct.

Capsules straight; operculum short-conic. *L. polycarpa.*

Capsules curved; operculum long-conic. *L. arenicola.*

Leaves straight; leaf-cells small, indistinct; capsules straight, erect.

L. microcarpa.

Leaves ovate, subacute to obtuse, less than twice as long as wide.

Leaves symmetric, biplicate, margins often revolute.

L. gracilescens.

Leaves asymmetric, not plicate, margins plane.

L. obscura.

HETEROLESKEA: leaves smooth or nearly so, costate or ecostate, median cells longer than wide; peristomial teeth erect when dry.

Leaves denticulate, ecostate.

L. denticulata.

Leaves entire or nearly so, costate;

Acumen longer than body;

Costa subpercurrent.

L. nervosa.

Costa short.

L. Williamsi.

Acumen shorter than body;

Costa short, bifid.

Leaves smooth.

L. tectorum.

Leaves subpapillose.

L. cyrtophylla.

(1) *Leskea polycarpa subobtusifolia* (C. M. & K.) Best.

Leskea subobtusifolia C. M. & K.; Macoun, Cat. Can. Pl. 6:169. 1892.

Subsp. *L. obtusifolia* Kindb. Eur. & N. Am. Bry. 25. 1896.

Tufts dirty yellowish green; stems and branches curved at tips; stem-leaves subsecund, biplicate, ovate-oblong to ovate-lanceolate, subacute to obtuse, obliquely pointed, the lower acuminate and blunt-pointed, 1 mm. long, 0.4 mm. wide; leaf-cells as in *L. polycarpa*. Macoun, Canadian Musci 533.

Professor Macoun has kindly loaned me the duplicate of the type, collected at Sprout, Pass River, B. C., as well as other material from the same locality and referred to it. All the specimens are destitute of fruit and are unquestionably but forms of *L. polycarpa*, nearer however the var. *paludosa* than the type. It is retained as a variety from the fact that the sporophyte when found might possibly offer something distinctive entitling it to specific rank.

(2) *Leskea arenicola* Best.

Plants somewhat rigid, in loosely spreading tufts, pale yellowish green passing to reddish brown; stems 2-5 cm. long, creeping, radiculose, pinately branched; branches simple, ascending, sometimes curved; central strand small, distinct: paraphyllia multiform, mostly linear-lanceolate: stem-leaves rigid, secund, 0.4-0.5 mm. wide, 0.8-1 mm. long, ovate to ovate-lanceolate, obliquely acuminate, acute to blunt-pointed, scarcely biplicate, margins usually recurved at base, entire or sinuate-serrulate above, costa disappearing in the acumen; leaf-cells somewhat clear, stoutly uni-papillate on under

surface, usually smooth on upper alar; cells quadrate, in 5 or 6 rows; median oval-rhombic to oblong-fusiform, 8-9 μ wide, about twice as long; branch-leaves broadly lanceolate, scarcely secund, 0.25-0.35 mm. wide, 0.5-0.7 mm. long; monoicous; perichetial bracts appressed, plicate, costate, long and narrowly acuminate, entire or serrulate above; pedicel 1.5 cm. long, grooved, twisted to the left below, to the right above, curved, reddish; capsule oblong-cylindric, curved, tapering at base, wrinkled when dry; urn about 2 mm. long, 0.6 mm. wide; exothecial cells oblong-linear, thick-walled; annulus broad, 2-3 rows of cells; teeth lanceolate-linear, 0.6-0.7 mm. long, 0.03 mm. wide, yellowish below, pale above, densely papillose, divisural line faint, ventral surface strongly lamellate; endostomial band yellowish, papillose, about one-seventh the length of the teeth; segments as long as the teeth, split, scarcely open on the keel; cilia rudimentary; operculum whitish, subshining, narrowly conic, about one-half as long as the urn; calyptra cucullate; spores smooth, 10-13 μ , mature in early summer. On the base of trees, rarely on decaying wood, in sandy places. (Plate 15, Figs. 1-13.)

TYPE LOCALITY: Delaware; collected by Mr. A. Commons, June 9, 1894; type in the New York Botanical Garden.

DISTRIBUTION: From Maine southward along the coast to Virginia and northward and westward to Minnesota and Dakota. Maine (Merrill); New York (Maxon, Grout); New Jersey (Best); Delaware (Commons); Maryland (Smith, Holzinger); Virginia (Vail and Britton); Ohio (Lesquereux); North Dakota (Holzinger); Minnesota (Holzinger).

EXSICCATAE: S. & L. Musc. Bor. Am. 243 and 365 as *L. obscura*; Ren. & Card. Musc. Am. Sept. 192b as *L. polycarpa forma*.

My first acquaintance with *L. arenicola* was in 1892 while collecting in the New Jersey pine-barrens. Recognizing its distinctness as a species specimens of it were distributed under this name. Subsequently, however, while examining the collection of the New York Botanical Garden, the same species was found under the name of *L. Donnellii*, having been collected in Maryland by Mr. J. Donnell Smith and so named by Austin. The type being in a poor condition, with only fragments of peristomes and no opercula, it was thought best to discard Austin's manuscript name and use a type as well as a new name.

L. arenicola is readily distinguished from all other species of *Euleskea* by its curved capsules, longer teeth and segments, longer and narrower opercula and by its rhombic, elongated leaf-cells. In its general appearance it resembles some forms of *L. polycarpa paludosa*, from which it is however easily separated by the character just named. When once understood it will probably be found more common than here indicated.

(3) ***Leskea nervosa nigrescens*** (Kindb.) Best.

Leskea nigrescens Kindb. Bull. Torrey Club, **16**: 97. 1889.

Leskea nervosa var. *flagellifera* Kindb. Ottawa Nat. **4**: 62. 1890.

Anomodon heteroideus Kindb.; Macoun, Cat. Can. P. 6: 62. 1890; Eur. & N. Am. Bry. **12**. 1896.

In intricate tufts or mats, dirty yellowish green to dark green or black; stems 2-3 cm. long, creeping, scarcely radiculose, defoliate or with distant ovate narrowly acuminate recurved leaves, irregularly branched; branches usually few, short, ascending with numerous flagelliform branchlets, commonly bearing bulbils at their tips; branch-leaves as in type but

smaller, 0.2–0.3 mm. wide, 0.4–0.6 mm. long; leaf-cells quadrate-hexagonal smooth or slightly papillose, 6–8 μ wide; leaves of branchlets rudimentary, scarcely costate; sterile. On the base of trees, sometimes on stones and rocks; with the type but less common; Canad. Musc. 395.

In nearly all specimens of this variety leaves, from either stems or branches may be found sufficiently developed to show that they are identical with those of *L. nervosa*, proving conclusively that var. *nigrescens* is only a retrograde form of this species. Moreover tufts are often made up of both plants growing together, the one bearing bulbils in small heads, the other a few on flagellate branchlets. While these organs are usually sessile when in compact clusters, they sometimes appear on short flagellate stems, thus constituting a transitional form between those of the type and those of var. *nigrescens*. Such was conspicuously the case with a specimen from Vermont (Dr. Grout).

(4) *Leskea Williamsi* Best.

Plants quite small, in spreading subshining tufts, pale yellow to golden brown; stems slender, creeping, radiculose, pinnately branched, 2–4 cm. long; central strand none: branches ascending, simple or with flagellate branchlets; lower stem-leaves decolorate, roundish ovate, abruptly acuminate, costa short, nearly obsolete; upper stem-leaves appressed when dry, erect spreading when moist, straight or subsecund, entire or serrulate above, ovate lanceolate, acuminate, acumen about as long as the concave biplicate body, 0.25–0.35 mm. wide, 0.4–0.5 mm. long; margins recurved below or plane all around; costa short, thin, simple or bifid, scarcely reaching the middle; branch-leaves smaller, 0.15–0.20 mm. wide, 0.25–0.4 mm. long; leaf-cells smooth clear; median linear-rhomboidal to fusiform, subvermicular, about 6 μ wide, 3–5 times as long; alar quadrate to transversely oval, in about 4 rows, extending well up the margins and passing to oval-oblong; dioicous; perichetial bracts oblong-lanceolate, acuminate, striate-plicate, inner subvaginant; pedicel smooth, flexuous, about 1 cm. long; capsule straight, erect or inclined, oblong-subcylindric, tapering at base; urn 2 mm. long, 0.7 mm. wide, brownish; teeth reddish, incurved when dry, lanceolate, confluent at base, finely striate below, rugulose above, divisural line distinct, ventral surface lamellose; endostomial band strongly reticulated, about one-fourth the length of the teeth; segments narrow, concave keeled, hiant, about as long as teeth; cilia none; annulus of two rows of pellucid cells, shed with the operculum; operculum conic, straight or obliquely beaked; calyptra cucullate, reaching to the base of the capsule; spores smooth, 10–13 μ wide, mature in summer. On rocks and rotten wood. (Plate 16, Figs. 55–68.)

TYPE LOCALITY: Montana: type collected by Mr. R. S. Williams, on Tenderfoot or Belt Mountains, Sept. 9, 1891; now in the Herbarium of the New York Botanical Garden; also collected by Mr. Williams at Columbia Falls, Mont., and by Prof. Holzinger in Minnesota.

In general appearance *L. Williamsi* resembles the smaller forms of *L. tectorum*, from which it differs, however, by its narrower, longer acuminate, often serrate leaves, its longer median cells, its broader, strongly reticulated endostome and its striate-plicate perichetial bracts. Named in honor of my friend Mr. R. S. Williams.

(5) *Leskea Williamsi filamentosa* Best.

In thin loosely spreading or somewhat intricate tufts, pale green pass-

ing to yellowish green or reddish brown; stems prostrate, defoliate or with a few rudimentary leaves, sparingly branched; branches filiform, diffusely spreading, 2-5 cm. long; branchlets flagellate, brittle, broken when dry; larger branch-leaves narrowly ovate-lanceolate, long-acuminate, erect, not plicate, entire or serrulate above, 0.15-0.2 mm. wide, 0.3-0.5 mm. long; costa thin, commonly marked by 3 or 4 rows of enlarged cells, disappearing below the middle; leaf-cells smooth, clear, not uniform; median cells oval-rhombic to linear-rhomboidal, 2-4 times as long as wide; alar quadrate, in 3 or 4 rows; leaves of branchlets similar, smaller, sometimes rudimentary; sterile.

Type of variety collected by Mr. L. F. Anderson on rocks near Lahoon, Idaho. Drummond's Musci Americana 219, in part; Brandegee's Mosses of Southern Colorado 38.

This delicate little moss appears to have been a standing puzzle for several years. It was found in some of the sets of Drummond's Musci Americana No. 219, but not in all, and was distributed as *Hypnum catenulatum*. Some of the other sets of this number, but not all, contained *Heterocladium heteropteroides filescens*, a moss it closely resembles, but which differs in being papillose. Some years ago Mr. Gepp sent me from the Natural History Museum in London a portion of one set of Drummond's 219 bearing the name of *Hypnum graveolens* Wils. It therefore appears that so good an authority as Wilson had discovered that the moss in question was not *Leskea catenulata* (Brid.). Subsequently Mrs. Britton gave me some specimens of Brandegee's No. 38, which I named *Heterocladium heteropterum fallax* Milde? A careful study of Drummond's 219 and Brandegee's 38 made it obvious that we had to deal with an attenuated form of some species which under more favorable conditions grew better developed.

(6) ***Leskea tectorum flagellifera* Best.**

In somewhat dense compact tufts, pale green to yellowish-brown; stems prostrate, pinnately branched; branches filiform with numerous flagellate deciduous branchlets; stems defoliate, rarely with rudimentary leaves; branch-leaves as in type but usually much smaller; leaf-cells smooth, clear, oval-rhombic; leaves of branchlets very small, 0.05-0.1 mm. wide, 0.1-0.2 mm. long. Differs from *L. Williamsi filamentosa* by its entire leaves and larger leaf-cells. Type of variety collected by Mr. R. S. Williams at Columbia Falls, Montana, Sept. 5, 1895; found also by Professor Holzinger in Minnesota. It usually grows on rocks and rotten wood.

The North American *Heteroleskeae* differ from the European by being usually more markedly proliferous. The somewhat dense tufts of var. *flagellifera* are mostly flagellate branchlets which when dry readily separate from their attachments. By soaking these tufts and dissecting out the stems and branches leaves may usually be found sufficiently developed to make possible the identification of the plants.

(7) ***Leskea gracilescens* (Hedw) Best.**

L. gracilescens is quite common and widely distributed, ranging through the Eastern, Middle, Northern and Western States, rare in Canada and in the Southern States and absent west of the Rocky Mountains. It differs from the closely related *L. polycarpa* by its smaller straight leaves which are shorter and comparatively broader, usually gradually acute and blunt

pointed, and by its shorter, often unequal segments. In some of its forms it approaches *L. polycarpa*, in others *L. obscura*, without however fitting either as a variety. In general terms it may be said that all those doubtful forms that plainly do not belong to either of these species should be referred to *L. gracilescens*, which moreover has priority over the last.

(8) ***Leskea tectorum*** (A. Braun) Best.

Widely distributed and quite variable, *L. tectorum* is usually easily recognized when once understood. Its leaf-cells, broad, plump, rounded, glassy, furnish its most distinctive character. Its leaves are quite like those of *Amblystegium adnatum* but some what smaller. This differs, however, in having its leaf-cells longer and narrower, especially in the upper part of the leaves, so that no difficulty need be experienced in discriminating between the two species. The closely allied European *Leskea catenulata* (Schwägr.) Brid., undoubted specimens of which have not as yet been reported from North America, may be known by its narrower, longer and thicker costa, usually reaching the middle and not forking, and by its thick-walled leaf-cells.

The type of *L. Wollei* Aust. has been compared with European specimens of *L. tectorum*, with the result of finding them nearly or quite identical. While the median leaf-cells are slightly longer, sometimes more rhomboidal than in the ordinary forms of this species, the same variations occur in foreign specimens. The cotype of *Pseudoleskea malacoclada* C. M. & K., through the kindness of Prof. Macoun, has likewise been seen and carefully examined. Although it is slightly stouter and the basal margins of the leaves are more commonly recurved, it differs in none of the essentials from the specific type of *L. tectorum*.
Rosemont, N. J.

BIBLIOGRAPHY—T. P. JAMES.

In response to a request to supplement the article on Thomas P. James by a list of his writings, Mrs. Gozzaldi writes the following under date Oct. 8, 1903. "My father was so much taken up with the study of Bryology and his work in the Horticultural and Pomological Societies that he wrote very little outside these lines for publication. I will add what I can think of to these." Then follows: Life of William Darlington, M. D.; "Anophytes" in Darlington's Flora Cestrica; Flora of Delaware Co., Pa. in Dr. George Smith's History of Delaware Co.; The Journal of Pursh the Botanist, Edited and Published by T. P. J.; "Anophytes" in Smithsonian Report of Flora of Alaska, by J. T. Rothrock; "Mosses" in Vol. V, Clarence King Surveys, and the Manual of the Mosses of North America in connection with Lesquereux.
A. M. S.